AF/2700

Attorney Docket No. 8194-140IP2

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Paul Wilkinson Dent
Serial No.: 09/461,671
Filed: December 14, 1999
For: ANTENNA COUPLING SYSTEMS AND METHODS FOR TRANSMITTERS

Group Art Unit: 2685
Examiner: Sheila B. Smith
Confirmation No.: 4127

August 8, 2003

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Commissioner for Patents
P.O. Box 1450
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TRANSMITTAL OF APPEAL BRIEF
(PATENT APPLICATION--37 C.F.R. § 1.192)

1. Transmitted herewith, in triplicate, is the APPEAL BRIEF in this application, with respect to the Notice of Appeal filed on June 26, 2003.

2. This application is filed on behalf of
   ☐ a small entity
   A verified statement ☐ is attached; ☐ was already filed.

3. Pursuant to 37 C.F.R. § 1.17(c), the fee for filing the Appeal Brief is:
   ☐ small entity $160.00
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Date of Signature: August 8, 2003

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APPELLANT'S BRIEF ON APPEAL UNDER 37 C.F.R. § 1.192

Sir:

This Appeal Brief is filed in triplicate pursuant to the "Notice of Appeal to the Board of Patent Appeals and Interferences" filed on June 26, 2003.

REAL PARTY IN INTEREST

The real party in interest is Ericsson Inc., Research Triangle Park, North Carolina, the assignee of this application.

RELATED APPEALS AND INTERFERENCES

To Appellant's knowledge, there are no currently pending appeals or interferences related to the present appeal.

STATUS OF CLAIMS

Appellant appeals the final rejection of all of pending Claims 1-50, which as of the filing date of this Appeal Brief remain finally rejected in the Final Official Action of March 27, 2003 (the "Final Official Action"). The attached Appendix A presents the claims at issue as rejected in the Final Official Action.

STATUS OF AMENDMENTS

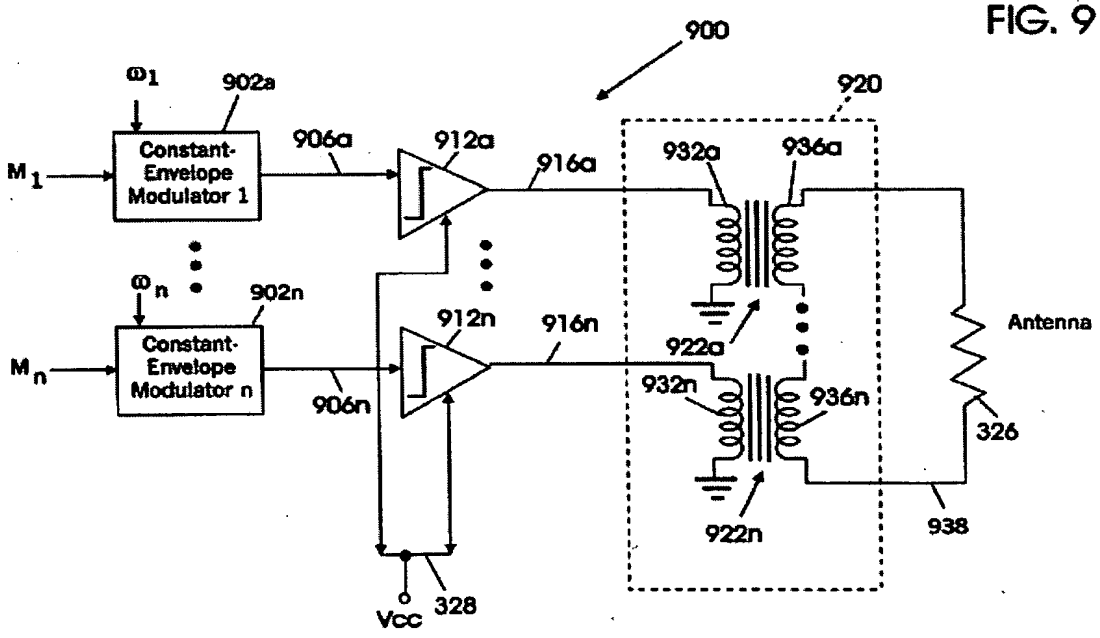
There have been no amendments filed subsequent to the Final Official Action of March 27, 2003. A telephone interview was conducted with the Examiner on Thursday, June

5, 2003, pursuant to the Detailed Agenda attached hereto as Appendix B. The interview did not result in any agreement between Appellant and the Examiner or in any feedback from the Examiner. See, Appellants "Record of Telephone Interview With Examiner Pursuant to MPEP §713.04", filed June 26, 2003.

SUMMARY OF THE INVENTION

The present invention relates to transmitters and transmitting methods that can transmit from a common antenna at multiple radio frequencies, multiple radio channel frequency signals that are modulated with respective information modulation. Accordingly, the present invention describes techniques for transmitting multiple radio channel frequency signals that are modulated with respective information modulation, from a common antenna. Figure 9 of the present application, reproduced below for the convenience of the Board, illustrates an embodiment of the present invention.

FIG. 9



As shown in Figure 9, transmitters **900** employ a plurality of constant envelope modulators **902a**...**902n**, a respective one of which corresponds to a respective one of the plurality of radio channel frequencies $\omega_1...\omega_n$. Each modulator **902a**...**902n** generates a constant envelope modulation drive signal **906a**...**906n** at the corresponding radio channel frequency $\omega_1...\omega_n$ from the respective modulation information $M_1...M_n$. See the present application, Page 13, line 32-Page 14, line 5.

Still referring to Figure 9, a saturated power amplifier **912a**...**912n** is provided for each of the constant envelope modulation drive signals **906a**...**906n**, to produce a corresponding amplified output signal **916a**...**916n** at an output thereof. A coupling network **920** also is provided, that connects the outputs of the saturated power amplifiers **912a**...**912n** in series, to produce a combined signal **938** that is applied to the common antenna **326**. The common antenna **326** therefore radiates the plurality of radio channel frequency signals that are modulated with the respective information modulation $M_1...M_n$. Thus, each amplifier **912a**...**912n** amplifies a signal at a different radio carrier frequency $\omega_1...\omega_n$, that is constant envelope-modulated with a different information modulation $M_1...M_n$. See the present application, Page 14, lines 6-13.

As shown in Figure 9, the coupling network **920** includes a plurality of transformers **922a**...**922n**, each having a primary **932a**...**932n** and a secondary **936a**...**936n**. A respective primary **932a**...**932n** is coupled to a respective output of a respective saturated power amplifier **912a**...**912n**. The secondaries **936a**...**936n** are serially connected to the common antenna **326**. See the present application, Page 14, lines 14-24.

All of the pending Claims 1-50 have been rejected as being obvious over U.S. Patent 5,249,201 to Posner et al. (hereinafter "Posner"). However, as will be described below, Posner provides paralleling of multiple power output stages where the required power output is too high for a single stage, but does not describe systems or methods for transmitting multiple radio frequency signals that are modulated with respective information modulation at respective multiple radio frequencies. Moreover, as will be described below, Posner does not describe the series connection of the outputs of saturated power amplifiers to produce a combined signal that is applied to a common antenna.

ISSUES

1. Does Posner describe or suggest systems or methods for transmitting multiple radio frequency signals that are modulated with respective information modulation, from a common antenna, or a series coupling of saturated power amplifiers, as recited in independent Claims 1, 20 or 39?

2. Does Posner, taken alone or in combination with the secondary reference U.S. Patent 5,659,886 to Taira et al. (hereinafter "Taira"), describe or suggest the various coupling networks of Claims 13-16 and 32-35?

GROUPING OF CLAIMS

For purposes of this Appeal, independent Claims 1, 20 and 39, and dependent Claims 2-12, 17-19, 21-31, 36-38 and 40-50, related to systems and methods for transmitting multiple radio channel frequency signals that are modulated with respective information modulation, from a common antenna, may be grouped together, stand or fall together, and will be referred to herein as "Group I". Dependent Claims 13-16 and 32-35, related to various embodiments of coupling networks, may be grouped together, stand or fall together, are independently patentable and will be referred to herein as "Group II".

ARGUMENT

I. Introduction

All of pending Claims 1-30 have been rejected under 35 USC §103(a) as being unpatentable over Posner, or Posner in view of Taira.

The Patent Office has the initial burden under §103 to establish a *prima facie* case of obviousness. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). To establish a *prima facie* case of obviousness, the Patent Office must satisfy three requirements.

First, the prior art reference or combination of references must teach or suggest all of the limitations of the claims. *See In re Wilson* 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970) ("All words in a claim must be considered in judging the patentability of that

claim against the prior art"). Importantly, the teachings or suggestions must come from the prior art, not from the Appellant's disclosure. *See In re Vaeck*, 947 F.2d 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991).

Secondly, the prior art relied upon, coupled with the knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or to combine references. *In re Oetiker,* 24 USPQ2d 1443, 1446 (Fed. Cir. 1992); *In re Fine*, 837 F.2d at 1074; *In re Skinner*, 2 USPQ2d 1788, 1790 (Bd. Pat. App. & Int. 1986).

Third, the proposed modification or combination of the prior art must have a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *See Amgen, Inc. v. Chugai Pharm. Co.*, 927 F2d 1200, 1209, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991).

As emphasized by the Court of Appeals for the Federal Circuit, to support combining references, evidence of a suggestion, teaching, or motivation to combine must be clear and particular, and this requirement for clear and particular evidence is not met by broad and conclusory statements about the teachings of references. *In re Dembiczak*, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999). In an even more recent decision, the Court of Appeals for the Federal Circuit has stated that, to support combining or modifying references, there must be particular evidence from the prior art as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed. *In re Kotzab*, 55, USPQ2d 1313, 1317 (Fed. Cir. 2000).

As analyzed in detail below, Appellant submits that Claims 1-50 are not obvious in view of Posner or Posner and Taira.

II. ARGUMENTS IN SUPPORT OF ISSUES PRESENTED

A. The Group I Claims, Related to Systems and Methods for Transmitting Multiple Radio Channel Frequency Signals That Are Modulated With Multiple Information Modulation, From a Common Antenna, Are Unobvious In View of Posner.

The Group I claims include independent Claims 1, 20 and 39, and dependent Claims

2-12, 17-19, 21-31, 36-38 and 40-50. Claim 1 is representative:

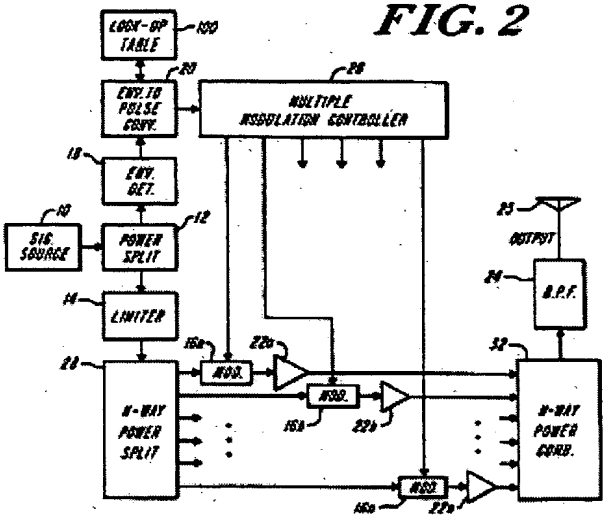
> 1. A transmitter that transmits from a common antenna at a plurality of radio frequencies, a plurality of radio channel frequency signals that are modulated with respective information modulation, the transmitter comprising:
>
> a plurality of modulators, a respective one of which corresponds to a respective one of the plurality of radio channel frequencies, each modulator generating at least one constant amplitude, phase modulated drive signal at the corresponding radio channel frequency from the respective information modulation such that the at least one constant amplitude, phase modulated drive signal corresponds to the information modulation for the corresponding radio frequency;
>
> at least one saturated power amplifier for each of the at least one constant amplitude, phase modulated drive signal that is responsive to the corresponding constant amplitude, phase modulated drive signal to produce a corresponding amplified output signal at an output thereof; and
>
> a coupling network that connects the outputs of the saturated power amplifiers in series to produce a combined signal that is applied to the common antenna, such that the common antenna radiates the plurality of radio channel frequency signals that are modulated with the respective information modulation. (Emphasis added.)

Thus, Claim 1 recites that multiple radio channel frequency signals are modulated with respective information modulation, and that a modulator is provided for each frequency. Each modulator generates at least one constant amplitude, phase modulated drive signal at the corresponding radio channel frequency that corresponds to the information modulation of the corresponding radio frequency. In contrast, in Posner, a single input signal is provided in parallel to each of a plurality of modulators. See, for example, Posner Column 5, line 66-Column 6, line 5:

> FIG. 2 is a functional block diagram of a multiple amplifier embodiment illustrating how the principle of the invention can be applied to an application where the required power output is high enough so as to require paralleling multiple RF power output stages. In this embodiment of the invention, it is advantageous to pulse modulate each of a number of parallel channels rather than the common input channel. (Emphasis added.)

A detailed analysis of Posner Figure 2 will now be provided. For the convenience of the Board, Posner Figure 2 is reproduced below:

FIG. 2



Posner generally describes Figure 2 at Posner Column 5, line 66-Column 6, line 40. As noted therein:

> FIG. 2 is a functional block diagram of a multiple amplifier embodiment illustrating how the principle of the invention can be applied to an application where the required power output is high enough so as to require paralleling multiple RF power output stages. In this embodiment of the invention, it is advantageous to pulse modulate each of a number of parallel channels rather than the common input channel. The functional blocks in the input portion including source **10**, power splitter **12**, limiter **14**, envelope detector **18** and envelope-to-pulse-duty-factor converter **20** are as described above in connection with FIG. 1.
>
> The pulse train output, designated the master pulse train, from converter **20** drives a multiple modulation controller **26** which acts as a commutator, applying the pulses of the pulse train sequentially to each modulator **16(1)**, **16(2)**, . . . **16(N)** such that each modulator operates at 1/N of the rate of pulse train. Accordingly, the inputs to modulators **16(1)**, **16(2)**, . . . , **16(N)** are a plurality (N) of interleaved pulse train signals, staggered in time by one pulse period and having a repetition rate N times lower than that of the master pulse train.
>
> The limited-amplitude output from limiter **14** is split into N parallel channels in an N-way power splitter **28**. Splitter **28** can be isolated or non-isolated (that is, it is optional as to whether there exist dissipative elements within the splitter which guarantee that the power into each of the channels is independent of the input impedance into each channel although it is assumed that the impedance is identical in the instance of no isolation). In each channel, a pulse modulator, such as **16(1)**, **16(2)**, . . . **16(N)**, drives, respectively, a corresponding nonlinear amplifier such as **22(1)**,

> **22(2)**, . . . **22(N)**, whose outputs are combined in an N-way power combiner **32**. Combiner **32** must be isolated, that is, it must contain dissipative elements that guarantee that the operating load impedance presented to each of the channels is independent of the source impedance or source power from each channel.
>
> The combined power output from combiner **32** is passed through bandpass filter **24**, typically to an antenna **25**. As with the embodiment of FIG. 1, no modification of the receiver need be made. (Emphasis added.)

As was already noted, the first above underlined passage of Posner clearly illustrates that Posner is paralleling multiple power output stages to provide higher power, rather than amplifying multiple information signals at multiple radio frequencies. The second underlined passage above clearly shows that a single signal from a limiter **14** is split into N parallel channels using an N-way power splitter **28**.

Thus, in Posner, the same signal containing multiple carriers is sent in parallel to multiple modulators, to provide enough power output. In contrast, Claim 1 recites that "a plurality of radio channel frequency signals that are modulated with respective information modulation" are provided to "a plurality of modulators, a respective one of which corresponds to a respective one of the plurality of radio channel frequencies", wherein each modulator generates at least one drive signal "such that the at least one constant amplitude, phase modulated drive signal corresponds to the information modulation for the corresponding radio frequency".

Finally, Claim 1 also recites:

> a coupling network that connects the outputs of the saturated power amplifiers in series to produce a combined signal that is applied to the common antenna, such that the common antenna radiates the plurality of radio channel frequency signals that are modulated with the respective information modulation. (Emphasis added.)

The Official Action notes that Posner includes an N-way power combiner **32** in Figure 2. However, as noted by Posner Column 6, lines 32-36 (the third underlined passage above):

> Combiner **32** must be isolated, that is, it must contain dissipative elements that guarantee that the operating load impedance presented to each of the channels is independent of the source impedance or source power from each channel.

There is no disclosure or suggestion that the coupling network connects the outputs of the saturated power amplifiers in series. In fact, Posner teaches away from series coupling by stating that the combiner maintains independent load impedances for each channel.

In responding to Appellant's arguments with respect to the series connection, the Final Official Action of March 27, 2003 stated at the paragraph bridging Pages 6 and 7:

> The applicant also argues that the art of record fails to specifically disclose a coupling network that connect the outputs of the saturated power amplifiers in series. The examiner contends that the limitation of the broadly stated claim 1 has been met the applicant is referred once again to figure 1, it is obvious that the signal once in the combiner (32) would have to be in series to output a single signal 24.

In this regard, Appellant wishes to note that Posner Column 6, lines 32-36, passage quoted immediately above, clearly shows that the combiner must be isolated, so that each of the channels is independent from the source impedance or source power from each channel. Since the combiner is isolated, it would appear to preclude a series connection, contrary to the Examiner's assertions.

Based on the analysis described above, there is no description or suggestion in Posner to separately modulate each separate radio channel frequency signal in a separate modulator to provide separate drive signals that correspond to the separate information modulation for the corresponding radio frequency. Moreover, it would not be obvious to modify Posner to do so, because Posner is directed to "an application where the required power output is high enough so as to require paralleling multiple RF power output stages". See also Posner Column 3, lines 16-19:

> Another object of the invention is to enable a plurality of nonlinear power amplifiers operating in parallel to provide a combined power output signal replicating a multiple signal source.

Moreover, it would not be obvious to modify Posner to provide "a coupling network that connects the outputs of the saturated power amplifiers in series", as recited in Claim 1, because Posner clearly describes isolation of the various channels of the combiner. For at least these reasons, independent Claims 1, 20 and 39 are patentable over Posner. Dependent Claims 2-19, 21-38 and 40-50 are patentable at least per the patentability of the independent claim from which they depend.

B. The Group II Claims, Related to Various Techniques for Coupling the Outputs of Saturated Power Amplifiers in Series, to Produce a Combined Signal for a Common Antenna, Are Not Described or Suggested by the Combination of Posner and Taira

The Group II claims include dependent Claims 13-16 and analogous dependent Claims 32-35. Claims 13 and 32 were rejected under 35 USC §103(a) as being obvious in view of Posner. Claim 13 is representative. Claim 13 recites:

> 13. A transmitter according to Claim 1 wherein the coupling network comprises a plurality of transformers, each having a primary and a secondary, a respective primary being coupled to a respective output of a respective saturated power amplifier, the secondaries being serially coupled to the common antenna.

Posner does not appear to contain any description or suggestion of any transformer coupling and, in particular, contains no suggestion of the transformer coupling recited in Claims 13 and 32. Moreover, it would not be obvious to combine a transformer with Posner absent the hindsight provided by the present application, because this combination would appear to destroy the operability of Posner by eliminating the isolation of the various channels of the combiner. Accordingly, Claims 13 and 32 are independently patentable.

Dependent Claims 14-16 and analogous dependent Claims 33-35 describe the use of quarter wavelength transmission lines or their equivalents for coupling. Claim 14 is illustrative. Claim 14 recites:

> 14. A transmitter according to Claim 1 wherein the coupling network comprises a plurality of quarter wavelength transmission lines each having first and second ends, a respective first end being coupled to a respective output of a respective saturated power amplifier, the second ends being coupled together to the common antenna.

Posner does not appear to contain any description or suggestion of any quarter wavelength transmission lines as recited in Claims 14-16 and 33-35. Taira is entitled *"Digital Mobile Transceiver With Phase Adjusting Strip Lines Connecting to a Common Antenna"*. However, assuming that phase adjusting strip lines connecting to a common antenna are known, it would not be obvious to combine a quarter wavelength transmission line with Posner, absent the hindsight provided by the present application, because this combination would appear to destroy the operability of Posner by eliminating the isolation of the various channels of a

combiner that is apparently required by Posner. Accordingly, Claims 14-16 and 33-35 are independently patentable.

CONCLUSION

Posner relates to a transmitter, so that signal sources, modulators and amplifiers are included. However, as was shown above, many of the recitations of the pending claims are not described or suggested by Posner, and it would not be obvious to modify Posner to provide these claim recitations. For at least these reasons Appellant respectfully requests reversal of the Final Official Action, and allowance of the pending claims.

Respectfully requested,

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